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(54) Title: METHODS AND FORMULATIONS FOR PROTECTING CELLS, AND FOR TREATING DISEASES AND CONDITIONS BY OPTIMIZING THE INTRACELLULAR CONCENTRATION OF NAD

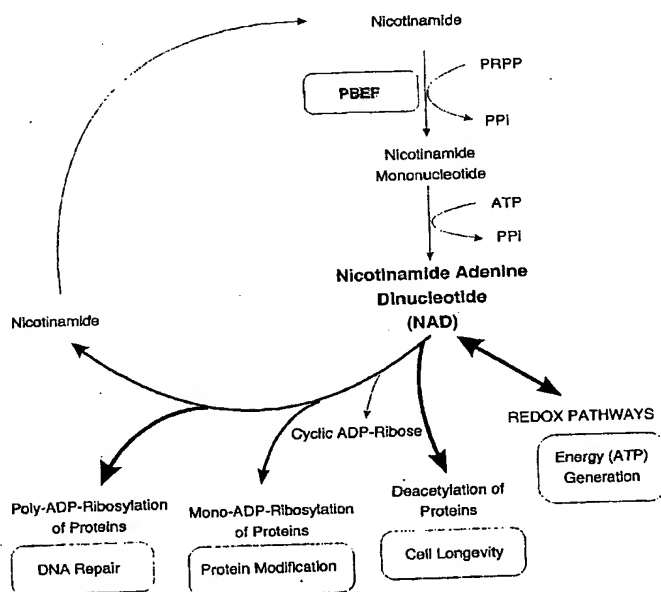


Figure Utilization and Regeneration of NAD

NAD is essential for redox pathways including oxidative phosphorylation, but these do not consume NAD. In contrast, NAD is consumed during vital cellular reactions such as DNA repair, protein modification, generating the signalling molecule cADP ribose, and NAD-dependent deacetylation of proteins. Maintenance of these reactions requires resynthesis of NAD from nicotinamide (salvage). PBEF is the rate-limiting enzyme for this salvage pathway.

(57) Abstract: Pharmaceutical and cosmetic formulations and methods for optimizing the intracellular concentrations of NAD are provided. The present methods and compounds relate to the use of PBEF, PRPP and various forms of nicotinamide, individually or in combination, for therapeutic, cyto-protective, cosmetic and anti-aging purposes. PBEF, PRPP and nicotinamide, individually or in combination, as administered according to the invention, increase the metabolic fitness, health and performance of the cell, and thereby increase the cell's level of health during its lifecycle. By way of the present formulations and methods, optimizing the intracellular concentration of NAD⁺ facilitates a balance among the numerous intracellular interactions of NAD⁺, and its related pathways, such that the health of the cell and its resistance to stress and trauma are increased. This increased robustness attendant to the invention also facilitates the delay of apoptosis.